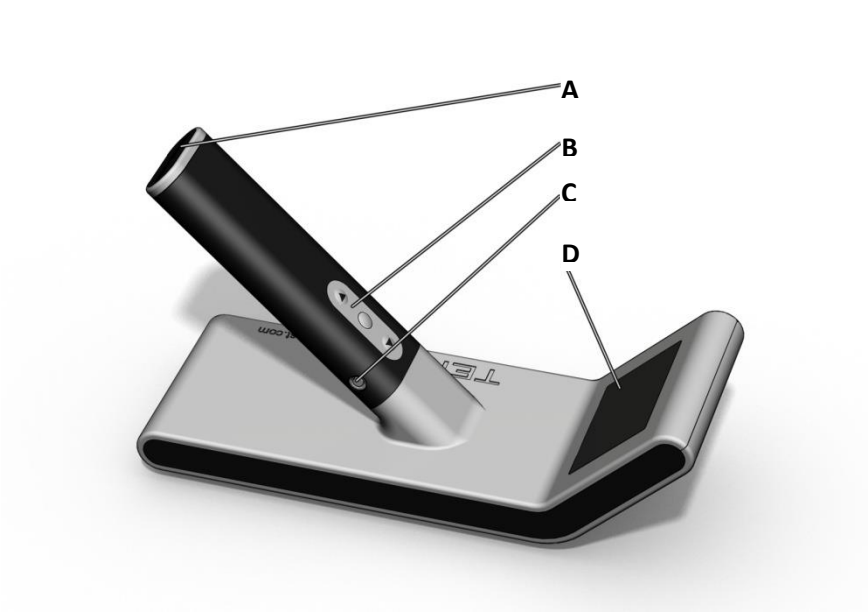
FELTEST
equipment

Feltest Tensio+

USER MANUAL

Version 1.24, May 2013

Overview



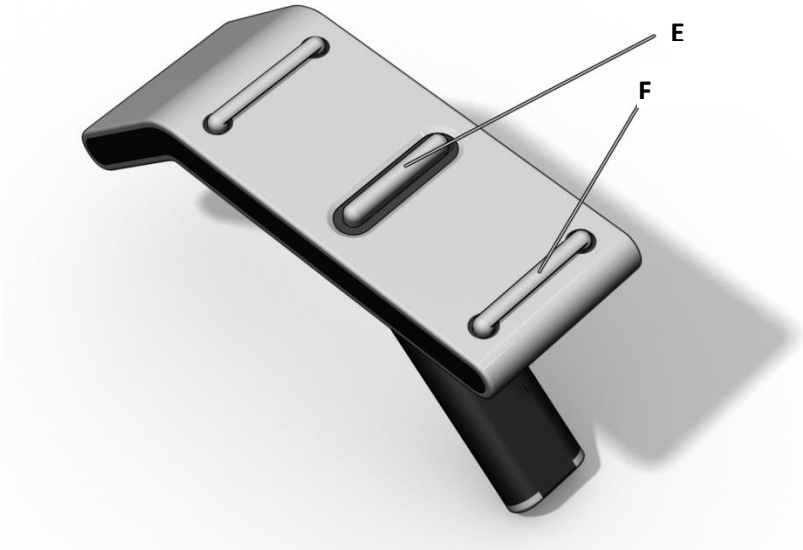


illustration 1

Contents

Overview 2
Introduction 4
Important 4
Intended Use 4
For Your Safety 4
Names of Parts 5
Getting to know the Tensio+ 5
  Switching on and off 5
  Charging the batteries 5
  Keeping the batteries in top condition 6
  Navigating the menus 6
  Setting up the Tensio+ 6
Executing Measurements 6
  Where to measure 7
  Set Zero 7
  Point Measurement 8
  Profile Measurement 9
Reviewing previous measurements 10
Connecting to the computer 11
  Importing measurement data into Excel© 12
Maintenance & Spare Parts 13
  Before every use 13
  Clean bottom side after use 13
  Replacing the battery pack 13
Trouble Shooting 14
Technical Data 14
Guarantee 14
Customer service 15
CE conformity 15
Trademarks 15

Introduction

Congratulations on your purchase of the Feltest Tensio+, the unique digital instrument to measure the tension in running paper machine fabrics like forming fabrics and press felts. The special corner contact sensors assure that the test results are accurate and reliable, independent of the operator.

Please read this user manual carefully, as it contains important safety information. With the proper handling and maintenance as described in this manual you will be assured of many years of enjoyable use of the Tensio+.

Important

Read this user manual carefully before you use the Tensio+. Save this user manual with the instrument, keeping it available for future reference.

⚠ DANGER

Doing measurements (of any kind) on running paper machines is potentially dangerous and requires alertness, concentration and common sense. The products of Feltest Equipment BV are designed and constructed to be as safe as possible for their intended use. Nevertheless it is the user's responsibility to actually use the instruments in a safe way. Feltest Equipment BV cannot be held responsible or liable in any way for suffered injuries or damages that occurred while using their products.

Intended Use

The Feltest Tensio+ is designed to measure the tension in paper machine fabrics (forming fabrics, press fabrics and dryer screens without metal 'clipper' seams) while the paper machine is running.

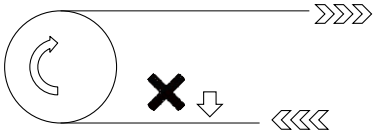
The Tensio+ may not be used on any other kind of fabric or for any other application because:

- The instrument might cause damage to the measured object or get damaged itself;
- The instrument might give unreliable test results;
- The instrument might be dangerous to use on other applications.

For Your Safety

The Tensio+ can only be used safely when all instructions and safety regulations are read carefully and strictly adhered to.

- ⚠ Be aware of the danger of rotating machine parts. Do not execute measurements close to in-going nips. You or the instrument could be grabbed and drawn into the machine, which can result in life threatening injuries and costly damages.



- ⚠ Do not measure forming fabrics or press felts with holes or damaged edges. Before starting your measurements, check with the staff of the paper machine if any holes or damaged edges are known. At the machine, first look carefully for any defects or signs indicating defects before

starting the measurement. If in doubt - do not measure!

- ⚠ Before starting a measurement, make sure to find a stable position with two feet on a solid base. Do not bend over into the machine! If you must lean against a safety fence (or similar) first check its stability.
  The Tensio+ can be operated using just one hand, use your other hand to stabilize yourself.
- ⚠ Always follow the safety instructions that apply for the location where the measurement is done. Do not ignore or remove safety constructions of the machine.

Names of Parts

Please refer to illustration 1 on page 2 for the names of the parts.

A. Cover of the battery compartment
B. Keyboard with up, down and enter key
C. Socket for USB cable and battery charger
D. Display
E. Tension sensor
F. Corner contact sensors; both corner contact sensors on the front side and the back side are connected by a small bar.

Getting to know the Tensio+

Switching on and off

The instrument is switched on by shortly pressing the centre key. To switch off the instrument, keep the centre key pressed for approx. 3 seconds (see illustration 2). On the display a progress bar will appear; when it reaches 'full' the instrument switches off.

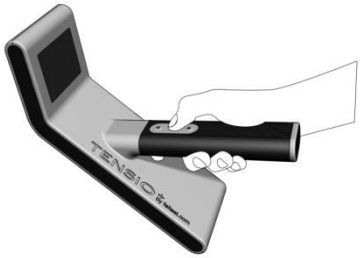


illustration 2

The Tensio+ has an auto-off function – this means the instrument will automatically switch off after 10 minutes of no activity.

Charging the batteries

The Tensio+ contains NiMH rechargeable batteries, which can be charged with the supplied battery charger.

First connect the charger to the Tensio+ by gently pushing the cable connector into the socket, located in the handgrip of the Tensio+ (see illustration 3). The red dots on the socket and the connector need to be right opposite to each other to connect.

illustration 3

Thereafter connect the charger to the mains. This electronic charger can be used worldwide because of its interchangeable primary plugs and its automatic power supply

switch (100-240 V AC). Attach the correct primary plug to the unit until it clicks in place.

The connector can be taken out of the socket by gently pulling out in a straight movement. Never turn the connector!

Please note that the Tensio battery is not charged when connected to a PC with the USB cable. Therefore it will not drain your laptop batteries.

Keeping the batteries in top condition

To keep the NiMH batteries in good shape please note:

- When you charge the Tensio+ for the first time or after a long period of disuse, let it charge for several hours (for example overnight);
- The first three times, use the Tensio+ until the batteries are almost completely empty. After that, there will hardly be a 'memory effect' meaning that the batteries can be charged ay time.
- Completely discharged NiMH can get damaged; to avoid this the Tensio+ will switch itself off when there is less than 10% capacity left.
  Due to the self-discharge effect of the batteries, the Tensio+ needs to be recharged every 6-8 weeks to keep the batteries top fit.

Navigating the menus

The Tensio+ has an easy accessible menu structure. During the start-up procedure, a splash screen is shown. When the Tensio+ is ready for use, the main menu will be shown (see illustration 4). With the up and down keys the desired menu item can be selected; shortly pressing the centre key will activate it.

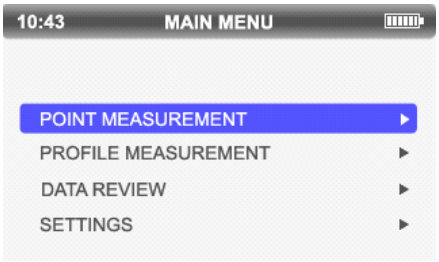


illustration 4

Setting up the Tensio+

By selecting the Settings menu in the Main Menu, the following settings can be changed:

- The language of the user interface; standard the Tensio+ comes with English, German and Dutch. Please contact Feltest Equipment BV for more languages.
- Date & Time; all measurements are saved using the date and time as part of the file name.
- Reset Sensors; this function will reset the tension sensor and it's electronics with a 'hard' Set Zero.
- Toggle between the following measuring units: kN/m, N/mm, kg/cm and PLI (Pounds per Linear Inch)

Executing Measurements

The Tensio+ can be used for point measurements and profile measurements.

Point measurements are done at one position; you measure the tension for example at the tender side of the fabric.

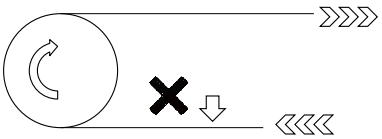
A profile measurement is a continuous measurement; the instrument continuously saves test results until the measurement is manually stopped. During the measurement the operator can walk across the paper machine, thus creating a Cross Machine Direction (CMD) profile.

Regardless of the type of measurement you will be doing, take good notice of the safety warnings both in this manual as at the paper machine.

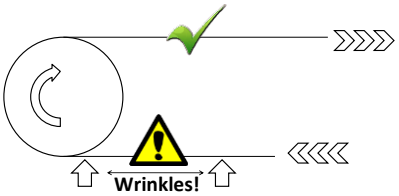
Where to measure

As measurements on the running paper machine are always potentially dangerous, the measuring position must be selected with great care. Please make sure it matches all these requirements:

- At least 1 meter away from ingoing nips;



- To avoid wrinkles on low tension (forming fabric) positions measure only after a roll;



- The best possible position is at approx. 1 m distance *after* a roll, where there is a safe and solid floor and the possibility to hold yourself with your free hand.

Set Zero

Before every measurement the tension sensor (E in illustration 1) is automatically set to zero. This is done to compensate for the weight of the tension sensor when you are measuring horizontally, vertically or above your head.

When you are ready to execute the measurement, select either Point Measurement or Profile Measurement from the Main Menu. A screen similar to illustration 5 is shown.

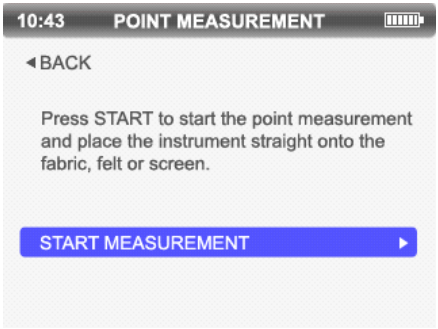

10:43
POINT MEASUREMENT
BACK
Press START to start the point measurement and place the instrument straight onto the fabric, felt or screen.
START MEASUREMENT

illustration 5

BEFORE pressing the centre key to start the measurement, FIRST keep the Tensio+ in the position in which you will be executing the measurement (for examples see illustration 7) and THEN press the centre button to start the measurement. Within 1 second the set-zero procedure is finished and the actual measurement can be started.

Note on measuring dryer fabrics

Tension measurements on running dryer fabrics will generate much static electricity which can destroy the Tensio+ electronics.

Therefore always use the supplied grounding cable (illustration 6): connect the cable to the Tensio+ and put the clamp on a suitable, not painted piece of the machine frame.

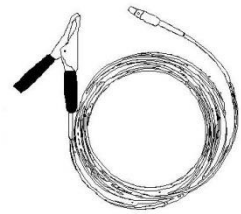


illustration 6

⚠ Take good care that the cable is not grabbed by the running fabric!

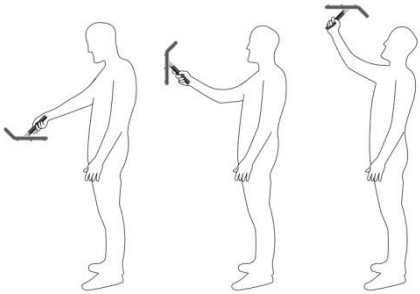


illustration 7

Point Measurement

In the Main Menu select Point Measurement and press the centre key. Now the type of fabric can be selected (illustration 8). The Tensio+ gives the most accurate results on forming fabrics; the soft, voluminous batt on press felts disturbs the measurement and needs to be compensated for. When measuring press felts, always measure on the roll side of the felt as it will contain less batt and therefore give more accurate results.

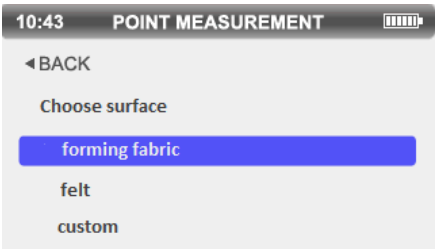


illustration 8

The type “custom” can be altered to suit special fabrics, please contact Feltest Equipment BV for more information.

After selecting the fabric type by pressing the centre key the automatic set-zero procedure is started (keep the Tensio+ in the correct position, see the previous paragraph, illustration 7) and then the word Measuring starts blinking.

Now move the Tensio+ towards the running fabric and make sure that the base of the Tensio+ is parallel to the fabric (i.e. flat) and gently push it on the fabric until in each corner of the display a blue dot appears, as indicated in illustration 9. Four dots indicate that the test result has been saved and you can take the instrument of the fabric.

Please read the TIP on the next page!

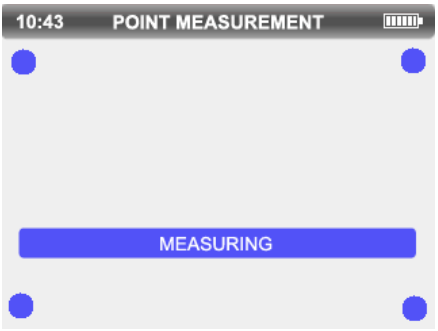


illustration 9

TIP: the best way to do the measurement is to lightly push the Tensio+ into the fabric and immediately withdraw again. If the "measuring" bar is still blinking, simple repeat the procedure with a little more force.

Do not 'toggle' or 'sweep' the instrument over the fabric; make a straight, perpendicular movement as indicated in illustration 10.

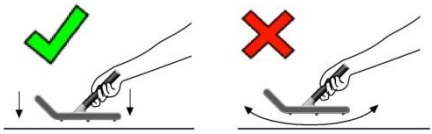


illustration 10

When the instrument has been taken of the fabric, the test result appears on the display (illustration 11). You can then either:

1. Exit without saving the result (Back Without Save);
2. Save the test result and continue with the next measurement on the same position without a new set-zero procedure (Save and Start New)
3. Save the test result and return to the Main Menu (Save)

"Reliability Measurement ….%" is an indicator for the quality of the measurement procedure where 100% means a very reliable test result. To improve your reliability percentage, fine tune how you push the Tensio+ on to the fabric. If you push the Tensio+ too hard, too fast or too long the reliability percentage will be less good.

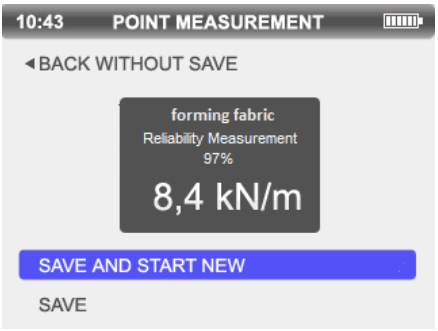


illustration 11

Profile Measurement

The Tensio+ can also be used to make a (Cross Machine Direction) tension profile of the fabric or felt.

In the main menu select Profile Measurement and press the centre key. The automatic set-zero procedure is started (keep the Tensio+ in the correct position, see the previous paragraph, illustration 5) and then the word Measuring starts blinking.

Now move the Tensio+ towards the running fabric and make sure that the base of the Tensio+ is parallel to the fabric (i.e. flat). Gently push it onto the fabric and start walking sideways regularly as shown in illustration 12.

⚠ To obtain the best quality profile, it is essential to apply a constant force pushing the Tensio+ onto the fabric. Any press force changes will become visible in the tension profile!

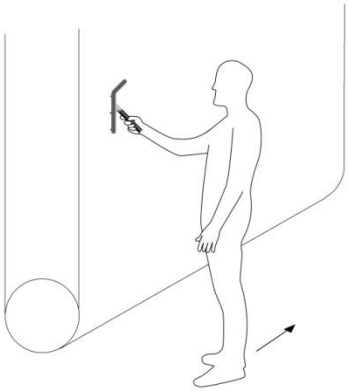


illustration 12

Stop the measurement by pressing the centre key and the profile will be shown on the display (illustration 13).

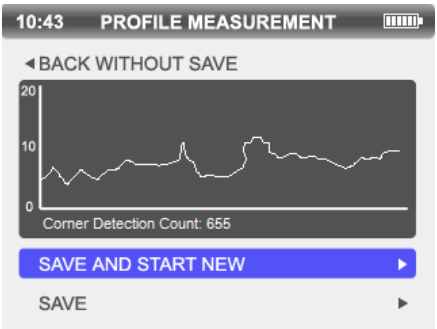


illustration 13

Under the chart the Corner Detection Count number shows how many times the four corner detection switches (F in illustration 1) all together switched On or Off. When this number is high, it indicates that during the measurement the contact sensors often lost contact with the fabric or felt. Therefore any peaks or valleys in the graph could also be caused by handling irregularities during the measurement.

Reviewing previous measurements

When the test result of both point or profile measurements are saved, they are organized in the systems memory by date and time. To take a look at previous measurement, choose Data Review in the main menu (illustration 14).

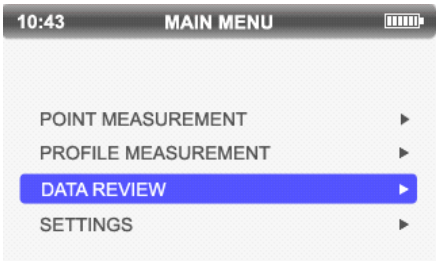
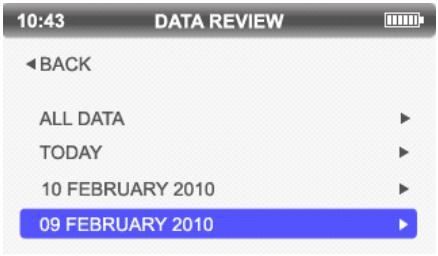
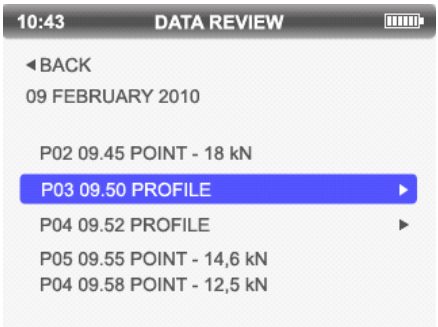


illustration 14

Then a list of dates appears and per date all profile and point measurements are listed. To view a profile, select the desired measurement and press the centre key.





Connecting to the computer

The Tensio+ can be easily connected to any Windows© based computer using the supplied USB cable.

⚠ When connecting the Tensio+ for the first time, make sure you have internet access on your computer as Windows© might need to download additional drivers and software from the Microsoft® website.

First connect the USB cable to the Tensio+ as shown in illustration 3. Then plug the USB connector in any available USB port in the PC.

If the Tensio+ wasn't already running, switch it on and Windows© will detect New Hardware (illustration 15).

illustration 15

Windows© will detect the type of product and start looking for the correct drivers over the internet; illustration 16 and illustration 17 will appear in the Windows taskbar.

illustration 16

The Tensio+ will automatically be recognized as a Windows Mobile-based device, just like mobile phones, PDA's and navigating systems that run on Windows Mobile©.

illustration 17

For these kind of devices Windows© uses a standard application called 'ActiveSync' in Windows XP or earlier versions and 'Windows Mobile Device Center' in newer versions of Windows like Vista and 7. If this application is not already installed on your PC, you can open the Programs section of the Windows Control Panel, select Turning Windows Features On or Off (illustration 18) and search for the Windows Mobile Device Center or ActiveSync.

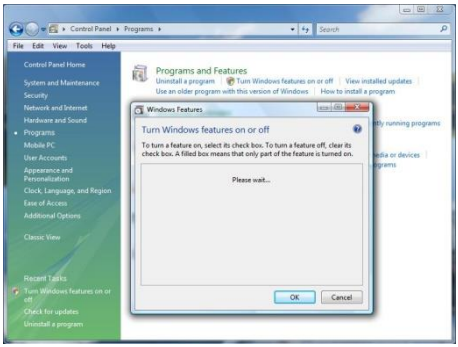


illustration 18

Alternatively you can enter the expression "download Windows Mobile Device Center" or "download ActiveSync" in your internet search engine to obtain the application freely and install it on your PC.

The next time you connect the Tensio+ to the PC the Windows Mobile Device Center will start-up automatically and showing a screen similar to illustration 19.

Windows Mobile Device Center
Home
Windows Mobile
Set up your device
Get Outlook contacts, calendar, e-mail and other information on your device.
Connect without setting up your device
Connected

illustration 19

You can now either select Set Up Your Device and enter a name, for example “Tensio+” or immediately start browsing in the saved test results by selecting Connect Without Setting Up Your Device.

⚠Windows Mobile Device Center can handle **only one device at a time**. So if you have already one device connected (for example your mobile smart phone) the second device will not be able to connect. In this case disconnect the other device.

Once the Tensio+ is connected to the PC, the normal Windows Explorer(tm) can be used to access the saved measurement data; which are saved on the FFSDisk and in the Measurements folder (see illustration 20).

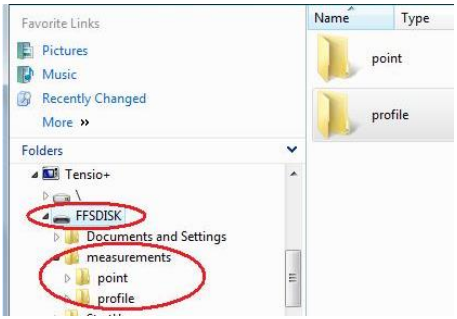


illustration 20

Importing measurement data into Excel©

The Tensio+ saves the measurement data in the .csv file format, which can be easily imported into spreedsheet applications as for example Microsoft Excel©.

All the data will be shown in one column, but that can easily be transferred to multiple columns by using the “Text to column” function of Microsoft Excel© (illustration 21).

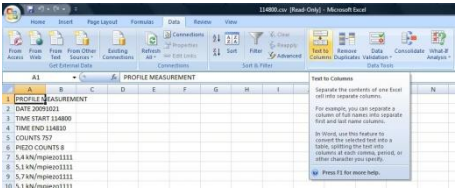


illustration 21

Maintenance & Spare Parts

The Tensio+ has been specifically designed for use in the Pulp & Paper industry. To keep the instrument function accurately and reliably, some maintenance is required.

Before every use

Before every use, carefully check if the instrument is in a good condition. Particularly check the 3 sensor bars on the bottom of the instrument (E and F in illustration 1); they may not be loose, have sharp edges or be seriously worn. If you notice any defects, do NOT use the instrument and return it for a maintenance service.

Clean bottom side after use

Before and after every use, check if the bars that connect the corner detection switches can move freely. Remove pulp or any other residues that might stick to the bars on the bottom side (illustration 22). To clean the space underneath the corner detection bars use a plastic (credit) card.

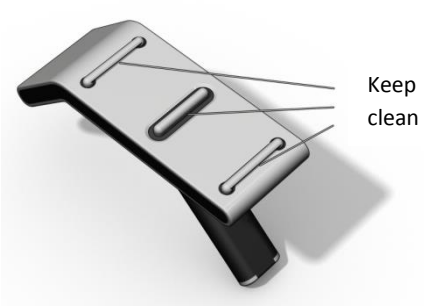


illustration 22

Replacing the battery pack

As with every battery pack, after many charges the batteries will lose their storage capacity and need to be replaced. Please follow this procedure:

1. Switch off the Tensio+ and pull out the rubber cover on the end of the hand grip.

2. Loosen the two screws underneath, please use a Torx screwdriver, size T10.

3. Carefully move the Tensio+ upside down to slide the battery pack out of the handgrip

4. Replace the battery pack in the right direction, with the red arrow on top. The battery pack will only fit one way.
5. Attach the lid on the battery container, tighten the two screws and close the rubber flap. Start to charge the new batteries for at least several hours.

Trouble Shooting

This chapter mentions some of problems that can occur, using the Tensio+. If the problem that you are encountering is not mentioned here, please contact Feltest Equipment BV by email (service@feltest.com) or phone.

- **The software hangs or crashes**: keep centre button pressed several seconds until the instrument switches off. To restart the Tensio+ press the centre button shortly.
- **Not all four blue corner detection dots show up** during a point measurement: this can have two reasons:
  1) Dirt underneath the bar that connects the two corner switches; clean underneath the bar, using for example a plastic credit card.
  2) One of the corner detection switches is broken; return the Tensio+ to the nearest Feltest service location. Please note that the Tensio+ is not able to execute the Point Measurement mode because only when all four corner switches are active, the measurement is stored. As an emergency solution one can use the Profile Measurement mode and use the average value as an alternative.
- **One of the blue corner detection points is constantly showing:** when the black rubber sealing ring is cold and stiff, it can prevent the switch from moving freely. When the Tensio+ is heated up at the paper machine, the problem usually disappears. If not, contact your nearest Feltest service location.
- **Windows Mobile Device Center** or **ActiveSync does not recognize the Tensio+**: both Windows applications only recognize one mobile device at the time. Check if another mobile device like a mobile (smart) phone or a navigation tool is already connected to your PC and disconnect it. Also check if the cable connector is correctly aligned to the Tensio+ socket.

Technical Data

Name	Feltest Tensio+
Measuring range	1.5 - 14 N/mm
Accuracy	± 5% + 0.1 N/mm
Measuring freq.	10 samples/sec.
Reading units	N/mm, kN/m, kg/cm, pli
Weight	1.2 kg
Operating System	Windows Mobile 5

Guarantee

Feltest Equipment BV warrants the proper execution of the agreed performance (as described in chapter 8 of this manual) for a period of twelve months after delivery.

Feltest Equipment BV warrants that the goods are of good quality and free from defects. Feltest Equipment BV shall only be liable under this warranty if the product is used under normal use and service conditions and in a proper manner as specified in the enclosed instructions. All other warranties are excluded.

No warranty is given for defects that are the result of:

a. normal wear and tear;
b. injudicious use;
c. non-maintenance or defective maintenance;
d. installation, alteration, assembly, modification or repair by Buyer or by third parties.

e. delivered items of goods that were not new at the moment of delivery;

No warranty is given for consequential loss or damage, for misusing and/or abusing and/or improperly maintaining the product in a manner contrary to Feltest Equipment BVs instruction manual.

If it transpires that the delivery or the product has not been sound and there is not a defect as mentioned above Seller may choose whether:

a. to repair the item of goods;
b. to replace the item of goods;
c. to provide the customer with a credit note for a proportionate part of the invoiced amount.

Customer service

T: +31 (0) 313 652 215
F: +31 (0) 313 652 215
E: service@feltest.com
www.feltest.com

CE conformity

We declare under our sole responsibility that this product is in compliance with the following norms:

89/336/EEC of 03.05.1989, EMC Directive.

The following standards have been used to show compliance with this EMC Directive:

a. Emission: NEN-EN 50081-1 January 1994
b. Immunity: NEN-EN 50082-2 June 1995

Ing. M.F. Lensvelt

Managing Director
Feltest Equipment BV

Trademarks

FELTEST and Tensio+ are trademarks of Feltest Equipment BV.

2013 subject to modifications